



METHOD AND MACHINE FOR FORMING PROTECTIVE
FILM ON SPRAYED COATING OF LARGE-SIZED PRODUCT

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a method of spraying a strippable liquid paint on the surface of a large-sized product finished with a sprayed coating, such as an automobile, to form a protective film. Also, the invention relates to a machine for implementing this method and to a method of forming this protective film in such a way that those portions ^{of the product} which need no protective film are not sprayed with the paint.

2. Description of the Related Art

^{Typically after an automobile is}
~~where an assembled automobile is shipped~~, it is ^{initially} ~~once~~ kept in stock. ^{before it} ~~Then, the automobile is shipped.~~ Therefore, a long interval passes until the vehicle is shipped. For this reason, dust or the like adheres to the surface of the sprayed coating. In order to prevent this adhesion of dust, it has been attempted to form a protective film on the surface of the sprayed coating of the automobile. In the past, this formation of the protective film has been carried out by applying a liquid, rust preventive wax.

In recent years, techniques for alleviating the burden imposed ^{by} ~~on~~ a wax-removing ^{operation} ~~work~~ performed at the destination or for environmental protection has been disclosed, for example in

Japanese Patent Laid-Open No. 267171/1991. In particular, a plastic film having a removable pressure-sensitive adhesive is pressed against the surface of an assembled automobile finished with a sprayed coating, using a vacuum. Thus, the body surface
5 is coated with this plastic film. In this way, the coating surface of the finished automobile is temporarily protected.

With respect to small parts, a strippable paint has been sprayed on them to form a protective film. ✓

A 10 In the above-described ^{known}~~prior art~~ method consisting of coating the body surface with a plastic film, the whole surface of the automobile is covered with the protective film. Therefore, the protective film is stuck even on those portions which are not required to be protected such as the windshield. This leads to a cost increase.

Where a strippable paint is employed, it is possible to protect only desired portions. However, if the sprayed object is large such as an automobile, the protective film lacks uniformity because of nonuniform drying, the film is damaged by matter adhering to the surface of the coating, or other problems take place.

Where a strippable paint is applied to the surface of the coating of a finished automobile in an attempt to form a protective film for the coating, dust or the like often adheres to the surface of the coating. Also, dirty water may adhere to
25 the surface. Furthermore, it may be wetted with rainwater or

the like. In these situations, appropriate and smooth formation of the protective film is hindered when a strippable paint is applied. Moreover, the temperature of the surface of the coating drops. This makes it difficult to form a protective film on the surface of the coating.

Where a strippable paint is applied, the fringes of a region to be applied with the paint are applied with the paint, using a brush or a roller. Then, the paint is sprayed against the inner applied region surrounded by the fringes. In this way, a masking operation is dispensed with.

However, in some cases, components which are not required to be sprayed with paint such as windshield washer nozzles are located around the center of the region to which a strippable paint is applied. The washer nozzles are holes for ejecting cleaning liquid toward the windshield. In these cases, if the paint is sprayed against the hood after the paint ^{has been} ~~is~~ applied to the fringes of the washer nozzles with a brush or nozzle, it is considerably difficult to perform the spraying operation in such a way that the paint does not adhere to the washer nozzles. Moreover, the strippable paint may be directly applied to the entrances to the windshield washer nozzles or enter the nozzles. Furthermore, dust of the paint may enter the nozzles. As a result, a film of the paint is formed at the entrances to the nozzles or even inside the nozzles. Hence, extra steps must be carried out to remove the film.

Where the roof of an automotive body ^{may be opened} ~~is openable~~ such as a sliding roof, a conceivable paint application method consists of first applying the paint to the vicinities of the opening in the roof and to the vicinities of the engaging portion of the roof with a brush or roller and then spraying the paint against the remaining desired portions. However, a sealing member made of rubber is mounted around the opening in the roof and acts as a seal when the sliding roof is in a closed state. Therefore, there is the possibility that dust of the strippable paint enters the gap between the rubber seal and the sliding roof.

A Side ^{turning lights} ~~winkers~~ which are mounted to right and left fenders, respectively, on an automotive body via rubber seals have similar drawbacks. Therefore, a ^{Procedure} ~~work~~ for removing the protective film of a strippable paint is inevitable ^{Procedure involves} ~~at~~ the destination. This ~~work needs~~ numerous steps. ¹³

A SUMMARY OF THE INVENTION

The present invention has been made to solve these various problems.

Ans. A4> A first embodiment of the present invention resides in a method of forming a protective film on the surface of a large-sized product finished with a sprayed coating, such as an automotive body, by applying a strippable paint to the product. Before the strippable paint is applied to the product, contaminations on the coating surface such as dust and ^{dirt} ~~soil~~ due

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to rainwater are removed as a pretreatment step. This pretreatment step consists of a washing step using warm water and a dehydrating step using ^{blown} ~~air blowing~~ which utilizes hot air.

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5 In this pretreatment step, ^{Contamination} ~~contaminations~~, such as dust, dirty water, and rainwater, adhering to the surface of the sprayed coating on an automotive body on which a protective film is to be formed are removed. This assures that a strippable paint ^{Will be} ~~is~~ smoothly and effectively applied to the coating surface on the automotive body.

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In a second embodiment of the invention, the step ^{of} ~~for~~ applying a strippable paint to a large-sized product finished with a sprayed coating, such as an automotive body, to form a protective film on the surface of the coating ^{Comprises steps} ~~consists of~~ applying the strippable paint to the product, preliminarily drying the product to which the paint has been applied, and then non-preliminarily drying the product. In this way, the protective film is formed on the surface of the sprayed coating of the product. The temperature at which the non-preliminary drying is effected is preferably 60 to 90°C.

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In the second embodiment of the invention, it is assured that a uniform protective film is formed on the surface of a large-sized product finished with a sprayed coating, such as an automotive body, by applying and drying ^{the} ~~a~~ strippable paint.

25 In a third embodiment of the invention, a paint

apparatus
application ~~machine~~ for forming the protective film ~~out~~ of the
strippable paint in the second embodiment described above is
provided to carry out the method for applying the paint. The
apparatus
~~machine~~ comprises a booth for applying the paint to the sprayed
5 product, a preliminary drying furnace for preliminarily drying
the strippable paint applied to the sprayed product, and a non-
preliminarily drying furnace for non-preliminarily drying the
product preliminarily dried. The preliminary drying furnace
uses an infrared drying furnace. A hot air drying furnace is
employed as the non-preliminary drying furnace.

In a fourth embodiment of the invention, a method for
spraying a strippable paint ~~against~~ ^{on} a large-sized product
finished with a sprayed coating, such as an automobile, and
equipped ~~either~~ with holes for ejecting liquid near the center
5 of the outer sprayed coating surface of the body ~~or~~ ^{and/or} with parts
in which the airtightness is enhanced by sealing members such
as rubber seals, ^{and/or} consists of masking a range considerably wider
than the applied region containing the ejecting holes ~~and~~ ^{and/or} the
parts with enhanced airtightness ~~components~~, spraying the strippable paint ~~against~~ ^{on} the product,
20 removing the masking materials, and amending the paint around
the holes ~~and~~ ^{and/or} the parts with enhanced airtightness ~~components~~. In this way, a protective film
is formed by spraying the strippable paint.

In the fourth embodiment of the invention, the strippable
paint for protecting the sprayed coating on a large-sized
25 product such as an automotive body is applied to the product to

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comprising a pressing step of forming panel parts by plastic working thin sheet steel, a welding step of forming an automobile body by welding the panel parts together, a painting step of painting the surface of this automobile body, a subsequent assembly step of mounting an engine and functional parts and the like on the body, anti-scratch cover fitting and removal steps disposed before and after the assembly step, a strippable paint coating step of coating the painted surface of the finished automobile assembled in the assembly step with a strippable paint, and a final inspection step.

By interposing a strippable paint coating step between the above-mentioned painting and assembly steps so that the engine and functional parts and the like are assembled after a protective film is formed, the above-mentioned anti-scratch cover fitting and removal steps can be made unnecessary.

With this kind of method, compared to a case where strippable paint coating is carried out after the automobile is finished as has been the norm, the adhesion of dust and the like occurring in the assembly step, or in the assembly step and the inspection step, can be prevented, and the amount of equipment required and the number of manufacturing steps involved can be reduced and cost reductions achieved.

Other objects and features of the invention will appear in the course of the description thereof, which follows.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 is a block diagram of illustrating successive steps of a method of forming a protective film on the surface of a large-sized product finished with a sprayed coating by applying a strippable paint according to the present invention, the successive steps containing a pretreatment step consisting of applying the strippable paint for forming the protective film and a subsequent ^{drying} step consisting of ^{multiple drying stages} ~~applying the strippable paint~~;

Fig. 2 is a plan view illustrating a method consisting of masking windshield washer nozzles and spraying a strippable paint according to the invention;

Fig. 3 is an enlarged cross section taken on line 3-3 of Fig. 2;

Fig. 4 is a side elevation illustrating a method consisting of masking ^{turning lights} ~~wipers~~ mounted at front fenders and spraying a strippable paint according to the invention;

Fig. 5 is an enlarged cross section taken on line 5-5 of Fig. 4;

Fig. 6 is a block diagram illustrating successive steps of a method of forming a protective film where the sprayed coating surface contains regions on which the protective film is not required to be formed ^{such} as illustrated in Figs. 2-5;

Fig. 7 is a block diagram of an automobile assembly process including a strippable paint coating step; and

Fig. 8 is a block diagram of another preferred embodiment of an automobile assembly process including a strippable paint coating step.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The preferred embodiments of the present invention are hereinafter described in detail by referring to the accompanying drawings. Fig. 1 illustrates successive steps for carrying out application of a strippable paint to form a protective film on a large-sized product finished with a sprayed coating, according to ^{a preferred embodiment of} the invention. The successive steps contain a step (pretreatment) carried out prior to application of the strippable paint and the subsequent step ^s ~~consisting~~ of applying the strippable paint ^{and drying the strippable paint}.

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In the illustrate^d example, the product having the sprayed coating to which the strippable paint is applied so as to form the protective film is an automobile. The body of this automobile is finished with a sprayed coating. Various appliances and components are incorporated in the body, thus producing a finished automobile. Then, the automobile is kept
20 in stock and shipped. Emphasis is placed on the coating of the automobile for the sake of appearance, and the automobile is a large-sized product.

Before the automobile is shipped in this way, a strippable paint is applied to the surface of the coating of the body to

form a protective film.

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The successive steps are next described by referring to Fig. 1. The ^{preferred of the invention} first embodiment is described now. The automobile

^{once} is manufactured and kept in stock and will be shipped.

5 Contaminations such as dust, dirty water, water such as rainwater adhere to the surface of the sprayed coating of the automobile. To form the protective film on this surface of the coating, the strippable paint is applied to the surface. Before the application of this paint, a pretreatment step is carried out. That is, it is necessary to remove contaminations such as dust, dirty water, water such as rainwater from the surface of the coating. Hence, the pretreatment step 3 is conducted before the strippable paint is applied to form the protective film for the coating of the automobile.

10 In the pretreatment step 3, the sprayed coating surface is cleaned with clean water to remove contaminations such as dust, dirty water, and rainwater. This is designated washing step 1. In this washing step, a shower washer is used to prevent the surface of the coating from being scratched. In the washing step, room-temperature water normally is used. However, in cold-weather conditions, warm water is preferably used.

20 The automobile which has undergone the washing step 1 described above is transported by an appropriate conveying machine 10 such as a conventional hand truck or conveyor to the next station where a dehydrating step 2 is carried out. In the

washing step 1, the surface of the sprayed coating of the automobile is wetted with water, which is required to be removed. In the dehydrating step 2, air is blown against the wetted surface of the coating of the automobile to remove the moisture from the surface of the body. In cold seasons, hot air is preferably used as the blown air, for the following reason. Where warm water is employed in the previous washing step 1, the air blowing step is effected, using hot air, in conformity with the warm water to maintain the surface of the coating of the automobile ^{when} sent to the next step at an appropriate temperature. The optimum temperature of the surface of the coating ^{having} undergone the washing step 1 and the dehydrating step 2 is 10 to 25°C.

In the case of an automobile having a displacement of the order of 2000 cc, if the temperature of the ambient surrounding the surface of the coating is -5°C, and if warm water of 40°C is sprayed against the surface of the coating at a rate of ^{1.5 l/min} ~~1.5 l/min~~, then a surface temperature of 18°C ± 2°C is obtained in 15 seconds.

In the pretreatment step 3 consisting of the washing step 1 and the dehydrating step 2 described thus far, when the automobile is kept in stock before being shipped, contaminations adhering to the surface of the coating of the automobile such as dust, dirty water, and rainwater are washed away. As a result, before the strippable paint is applied to

form the protective film, the applied surface is cleaned with certainty. Therefore, the paint can be appropriately, ^{reliably} ~~certainly~~, and smoothly applied, and the protective film is effectively formed on the surface of the coating.

A 5 The second ^{preferred} embodiment of the invention, which is a method of forming a protective film on the surface of the sprayed coating of a product, is next described. The automobile which has undergone the pretreatment step 3 described above has its coating surface cleaned. The automobile is then conveyed by the conveying machine 10 to the next station where an application step is carried out to apply the strippable paint for forming the protective film. The application step, indicated by 6, is conducted inside an application booth 4 which is similar in structure to a paint application booth normally used. However, because a water-soluble strippable paint is ^{preferably} used, it is necessary to give considerations to the temperature and moisture inside the booth.

A 20 ^{Substantially} Where a water-soluble strippable paint is used, it is desired that the temperature and the moisture inside the booth ^{in ranges of} be 10-25°C and 50-80%, respectively. As an example, Lapguard prepared by Kansai Paint Co., Ltd, Japan, was used as the water-soluble strippable paint, and it was applied inside the application booth 4 under the above-described temperature and moisture conditions.

25 Where the above-described water-soluble strippable paint

is used, the protective film might not be appropriately formed
from out of the paint if the temperature and the moisture are
outside the above-described ranges. Any desired means can be
employed to apply the strippable paint. For example, a brush,
5 a roller, or a spray gun may be used.

After the strippable paint has been applied inside the
application booth 4 in this way, the automobile is conveyed to
the next station where a drying step, indicated by 9, is
carried out. Prior to this conveyance, the automobile is moved
into a setting booth 5. In the present example, the automobile
is passed through the setting booth 5 between the application
step 6 and the drying step 9. Normally, the temperature of the
ambient inside the setting booth 5 is 15 to 30°C, and the
humidity is 50 to 80%. In this setting booth 5, the automobile
is allowed to stand for a long time after the application of
the strippable paint before the drying step to cause the formed
film to stabilize. The subsequent drying step 9 consists of
preliminary drying and non-preliminary drying.

After the automobile to which the strippable paint has
20 been applied has been moved out of the setting booth 5, the
automobile is conveyed into a preliminary drying booth 7 to
perform a step ~~previous to the drying step 9~~.

An infrared drying furnace is used as ^{a heat source in} the preliminary
drying furnace 7 to promote the drying of the protective film
from the thereof inside the protective film being formed on the surface of
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the coating. Preferably, the water-soluble strippable paint is illuminated with infrared radiation having wavelengths of 2 to

4 μ m for 30 to 60 seconds. If the drying process is ^{initiated} ~~started~~

from the ^{outer} surface of the protective film, holes or cracks will

5 be formed in the surface of the protective film because of

solvent or water emerging from inside ^{thereof}, thus deteriorating the

performance of the protective film. Hence, the drying is

^{preferably} accelerated from inside the protective film.

After the automobile is preliminarily dried in the

preliminary drying furnace 7 as described above, the automobile

is conveyed by the conveying machine 10 into a rear-stage, non-

preliminary drying furnace 8 where the automobile is dried in

a non-preliminary manner. A hot air drying furnace is ^{preferably} used as

the non-preliminary drying furnace 8 because it is possible to

uniformly heat the object to which the paint should be applied.

With respect to the temperature conditions under which the hot

air drying process is carried out, the automobile to which the

present invention is applied is a finished automobile

incorporating various electrical appliances and other

^{accessories} ~~accessories~~ that are vulnerable to heat. Therefore, in order

to protect these appliances and ^{accessories} ~~accessories~~, the drying

temperature is preferably in the range from 60 to 90°C. If a

drying process is carried out within this range, the electrical

appliances and ^{accessories} ~~accessories~~ can be prevented from being

25 deteriorated in quality ^{and} ~~per~~ characteristic.

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The layout of the application booth used for the application step and the drying step for the ^{applying} ~~application~~ of the strippable paint and ^{forming} ~~the formation of~~ the protective film, the preliminary ^{and non-preliminary} ~~drying furnace~~ used for the drying step, ^{and} ~~and the~~ ^{form} ~~non-preliminary drying furnace~~ forms the third embodiment of the invention.

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Where the protective film is formed by the application of the strippable paint as described above, the application and drying of the paint can be continuously, appropriately, ^{reliably} ~~certainly~~, smoothly, and efficiently conducted. Furthermore, the protective film can be formed uniformly. ^{particularly} ~~Especially~~, when the water-soluble strippable paint is dried, the preliminary drying furnace for effecting the preliminary drying step is ~~provided. The preliminary drying is~~ effected by irradiation of infrared radiation. In consequence, a uniform protective film having desired thickness and having neither holes nor cracks can be obtained.

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The fourth embodiment of the present invention is now described by referring to Figs. 2-6. Fig. 6 is a block diagram illustrating the successive steps of this embodiment.

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Shown in Fig. 2 is a hood 11 forming an example of an outer sprayed coating surface of an automobile. Two windshield washer nozzles 12 are formed on opposite sides of the center of the hood 11 to spray cleaning liquid against the windshield, for cleaning it.

Where a protective film is formed by spraying a strippable paint 13 on the hood 11, the following steps are carried out. First, a masking step 21 is conducted. That is, masking paper 14 is stuck on a region which is somewhat wider than each washer nozzle 12 existing inside the region ^{i.e., the hood surface,} to which the strippable paint 13 is to be applied. Thus, the nozzle is covered. In Fig. 2, the masking paper 14 is shown to be stuck on the region around the right one of the washer nozzles 12; the left one is shown as it is to show one nozzle clearly. Then, a spraying-and-applying step 24 is effected, i.e., the strippable paint 13 is sprayed to apply the paint 13 to the coating surface of the hood 11. Thereafter, the masking paper 14 and pressure-sensitive adhesive tape 15 are removed. This is referred to as the peeling step 25. Finally, a repairing application step 26 is carried out. That is, the strippable paint 13 is applied to the surroundings of the washer nozzle 12 so as to repair the film. Subsequently, the repaired portion is subjected to a drying step 27.

In the masking step 21, a step 22 consisting of covering the washer nozzle 12 with a circular ^{piece of} masking paper 14, as illustrated in Fig. 2, is first performed. Then, the annular pressure-sensitive adhesive tape 15 is stuck on the coating surface of the hood 11 around the masking paper 14 (step 23).

^{Conventional}
A ~~Generally used~~ masking paper and pressure-sensitive adhesive
25 tape may be employed as the masking paper 14 and the pressure-

sensitive adhesive tape 15, respectively. A commercially available masking roll paper can be used as the masking paper 14. A pressure-sensitive adhesive tape manufactured by Nichiban Co., Ltd, Japan, is used as the adhesive tape 15.

5 In the next spraying-and-applying step 24, the strippable paint 13 is sprayed against the whole hood 11 including the masking paper 14 and the pressure-sensitive adhesive tape 15. The paint 13 is so sprayed that a desired protective film is formed on the surface of the hood 11 which is a coating surface. The method of spraying the paint may be either air spray or airless spray. The method may be selected according to the viscosity of the strippable paint 13.

10 In the peeling step 25, the masking paper 14 and the pressure-sensitive adhesive tape 15 on and around the washer nozzle 12 are peeled off.

Then, the repairing application step 26 is performed. In particular, after peeling off the masking paper 14 and the pressure-sensitive adhesive tape 15, the strippable paint 13 is applied to the unapplied region appearing around the nozzle 12, using a brush.

20 After completing these steps, the drying step 27 is carried out by air drying or forced drying to form a protective film around the masked portion.

A As shown in Fig. 4, a side ^{turning light} ~~winker~~ 17 for indicating the direction of movement of the automobile is mounted on the front

fender 16 together with rubber seal 18, the fender 16 forming an outer sprayed coating surface of the automobile.

Where the strippable paint 13 is sprayed on the front fender 16, a protective film is formed in the same way as in the above-described process. That is, the paint is applied by carrying out the masking step 21 for masking the unapplied region, the spraying-and-applying step 24, the masking peeling step 25, the repairing application step 26, and the drying step 27.

Also in this example, the strippable paint 13 is sprayed after desired portions are masked in the same way as in the case of the hood. More specifically, masking paper 19 is stuck on a region that is somewhat wider than the side ~~winker~~ ^{turning light} 17 located inside the region to which the paint 13 is to be applied so as to cover the ~~winker~~ ^{turning light} 17. The fringes of the masking paper 19 are fixed with pressure-sensitive adhesive tape 20. Then, the strippable paint 13 is sprayed on the coating surface of the fender 16 including the masking paper 19 and the tape 20. In this way, the paint 13 is applied to the coating surface of the front fender 16. Thereafter, the masking paper 19 and the peripheral adhesive 20 are peeled from the coating surface. The paint 13 is then applied with a brush to the unapplied region located around the side ~~winker~~ ^{turning light} 17. Natural drying or forced drying is selected and carried out in the same way as the foregoing ^{embodiment}. A protective film is formed on

this portion.

In the present example, the strippable paint is not applied to those portions which are not required to be coated with the protective film of the strippable paint. This makes it unnecessary to perform a cumbersome and complex strippable paint-removing ^{procedure} ~~work~~ at the destination. Furthermore, when the masking step is carried out, a region somewhat wider than the masked object is masked and, therefore, no parting step is necessary. As a result, the masking work is facilitated.

On automobile assembly lines, rustproofing wax or strippable paint is coated onto the painted surfaces of automobiles after they ^{have been assembled and passed} ~~pass~~ through a finished vehicle inspection step after being assembled in order to prevent scratching of the painted surfaces of the automobile bodies and the adhesion of dust and the like thereto. The strippable paint is coated onto the painted surfaces as described above.

Conventionally, as mentioned above, because coating of the strippable paint is often carried out in a separate step after the finished vehicle inspection step ~~after the automobile is assembled~~, there have been the following kinds of problems:

In order to prevent the adhesion of dust and dirt to the automobile body and to prevent scratching thereof in the assembly step ^s after painting of the automobile body, an anti-scratching cover is necessary, and steps of fitting and removing this anti-scratching cover ^{relative to the vehicle body} are necessary. As a

result, equipment and manufacturing steps for both scratch-
prevention and strippable paint coating are required. ^{Consequently,}
~~because~~ ^{Because}
~~consequently~~ a lot of equipment and numerous manufacturing
steps are required and the equipment and manufacturing steps
are discontinuous, ^{and therefore} an independent, separate
coating equipment space is necessary ^{in the conventional method, so that} this method is
disadvantageous from the space-efficiency viewpoint. Also,
strippable paint coating equipment and a coating step
completely separate from the steps and equipment which were
continuous up to the finished vehicle inspection step are
necessary and in some cases a double investment in equipment
and manufacturing steps is involved, and consequently the
method is disadvantageous from the economic viewpoint also.
Furthermore, individual and overall cost increases and
increases in man-hours result, and the method is therefore also
disadvantageous from the cost reduction and man-hour reduction
viewpoints.

Therefore, a strippable paint coating step by which the
above-mentioned strippable paint coating can be carried out
efficiently in terms of equipment and space and with which
scratching of the painted surfaces of the product and the
adhesion of dust thereto can be suitably and effectively
prevented is called for.

^{According to the present}
~~With this~~ invention a production line satisfying this need
can be provided, and preferred embodiments of the invention

with which these kinds of problem also can be solved will now be described in detail.

Fig. 7 and Fig. 8 show in order the manufacturing steps of two such preferred embodiments, ^{respectively}

5 Fig. 7 is a block diagram showing a first preferred embodiment of an automobile assembly process including a strippable paint coating step. In this preferred embodiment, first, in a pressing step 31, panel parts are formed by plastically working thin sheet steel. The pressed panel parts are then provisionally assembled using jigs or the like and transferred by a conveyor not shown in the drawings to a welding step 32. In the welding step 32 the panel parts are welded together by spot welding or the like to form an automobile body. The surface of this automobile body is painted in a painting step 33, ^{involving} ~~before painting is carried out~~, a conversion treatment ~~ordinarily performed is~~ carried out on the automobile body, ^{after which} and paint is then coated onto the body surface and the painting step 33 thereby completed. Although ~~this is~~ not shown in the drawings, after painting the automobile ^{ordinarily} goes through a drying step ~~ordinarily performed~~ and the paint is thereby dried to complete the painting step 33.

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After going through the above-mentioned painting step the automobile body is conveyed to an assembly step 34 and an engine and functional parts are fitted thereto. An anti-scratch cover fitting step 37 and an anti-scratch cover removal

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step 38 are provided before and after the assembly step 34. An
anti-scratch cover ^{conveyor} ~~conveying~~ apparatus 39 links these steps 37
and 38, and this anti-scratch cover ^{conveyor} ~~conveying~~ apparatus 39
conveys covers removed in the anti-scratch cover removal step
5 38 and returns them to the anti-scratch cover fitting step 37
for reuse.

Finished automobiles assembled in the assembly step 34 are
conveyed as they are to the next step which is a strippable
paint coating step 35. In this strippable paint coating step
35 a strippable paint which forms a protective film on the
painted ^{body} surface is coated onto the ^{surface} ~~above-mentioned region~~ and
goes through a drying step as above and a protective film is
thereby formed on the body surface. In this way a painted,
finished automobile with its painted surfaces protected by a
protective film is obtained. This is followed by a finished
vehicle inspection step ³⁶ wherein the conformity to
specifications of the finished automobile assembled and coated
with strippable paint are checked.

According to the above, ^{embodiment} because strippable paint coating
is carried out ^{immediately} after the assembly step is completed, scratching
20 and adhesion of dust and the like occurring between the
assembly step and the completed vehicle inspection step can be
prevented.

Fig. 8 is a block diagram showing in order the steps of a
25 second preferred embodiment of an automobile assembly process

including a strippable paint coating step. This second preferred embodiment of an automobile assembly process including a strippable paint coating step will now be described with reference to Fig. 8. Basically, most of the steps are common with those of the first preferred embodiment ^{of Fig. 7} described above.

In the automobile assembly process shown in Fig. 8, first, in a pressing step 41, panel parts are formed by plastically working thin sheet steel. The pressed panel parts are then provisionally assembled using jigs or the like and transferred by a conveyor not shown in the drawings to a welding step 42. In the welding step 42 the panel parts are welded together by spot welding or the like to form an automobile body. The surface of this automobile body is painted in a painting step 43; ^{involving} ~~before painting is carried out~~ a conversion treatment ^{after which} ~~ordinarily performed is carried out on the automobile body, and~~ paint is then coated onto the body surface and the painting step 43 thereby completed. Although not shown in the drawings, after being painted the automobile ^{ordinarily} ~~ordinarily performed~~ goes through a drying step ~~ordinarily performed~~ and the paint is thereby dried to complete the painting step 43.

After the above-mentioned painting step 43 and before the assembly step 44, a strippable paint coating step 45 is interposed. In the strippable paint coating step 45, strippable paint is coated onto the painted surface of the

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automobile body having passed through the painting step 43. After the strippable paint ^{is coated, it} ~~coating, the strippable paint~~ is dried by going through for example infrared drying ^{and/or} ~~for~~ hot-air drying as above, and a protective film is formed on the painted surface.

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After that, as above, the automobile body is conveyed to an assembly step 44 and an engine and functional parts are (mounted thereon. In this preferred embodiment, because the strippable paint coating step 45 is interposed after the painting step 43 and before the assembly step 44, the kind of anti-scratch cover fitting and removal steps provided before and after the assembly step in the preferred embodiment of Fig. 7 are unnecessary.

Completed automobiles assembled in the assembly step 44 are conveyed as they are to the next and final step, the finished vehicle inspection step, and finished vehicle inspections are carried out.

According to this preferred embodiment, together with the effect that it is possible to prevent scratching and the
20 adhesion of dust from occurring between the above-mentioned assembly step and the finished vehicle inspection step, as mentioned above the anti-scratch cover fitting and removal steps provided before and after the assembly step become unnecessary. It is notable in this connection that in the work
25 of assembling the engine and functional parts to the body in

the assembly step 44, dust and the like are unavoidable. However, as a result of the automobile bodies going through the strippable paint coating step 45 a strong protective film is formed on the painted surface by the strippable paint coating.

- 5 Consequently, even if dust or the like occurring in the assembly step alights on the painted surface it is prevented from affecting the painted surface and even if in the assembly step dirt alights on the painted surface of the body it can easily be removed by a subsequent simple wiping-off. With this preferred embodiment, as described above, because anti-scratch cover fitting and removal steps are unnecessary, cost and labor reductions can be achieved.

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